AID P - 2818

Elektrichestvo, 6, 37-43, Je 1955

Card 2/2 Pub. 27 - 7/30

wall and, consequently, of capacitance, depends not only upon permissible field intensity under normal conditions, but also on several operational requirements (temperature, humidity, mechanical influences, atmospheric pressure, operational voltage, and current frequency). The influence of unexpected changes in capacitor impedance, called the "flicker effect" is discussed in detail. The authors present in tabulated form the basic characteristics of several types of ceramic capacitors (KDV-1 to 5; KTN-1 to 6; KPS-1 to 4; KDK, KTK, KP, KPS). Four tables, 8 diagrams, 3 drawings, 2 references (1 Soviet) (1946-1953).

Institution : None

Submitted : Ja 11, 1955

Bogorodi tsky. N.P.

KUIEBAKIN,V.S.; ALEKSEYEV,A.Ye.,; LARIONOV,A.N.; BOGORODITSKIY,N.P.;
CHILIKIN,M.G.; VASIL'YEV,D.V.; ODINTSOV,G.V.; PETROV,I.I.;
FATEYEV,A.V.; GOLOVAN,A.T.; MOROZOV,D.P.; BASHARIN,A.V.

S.A.Rinkevich. Elektrichestvo no.9:85 S'55. (MLRA 8:11)
(Rinkevich, Sergei Aleksandrovich, 1886-1955)

BOGORODITSKIY, N. P.

AID P - 3442

Subject : USSR/Electricity

Card 1/1 Pub. 27 - 9/32

Authors : Bogoroditskiy, N. P., Doc. of Tech. Sci., Prof.
P. A. Mulyar, Kand. of Tech. Sci., Leningrad

Title : Electroceramics, glass, and organic plastic materials

Periodical : Elektrichestvo, 10, 35-39, O 1955

Abstract : The authors examine two groups of new electric insulating materials: electro- and radio-ceramics, new insulating glass, and organic plastic masses. Properties and characteristics are discussed and presented in two tables.

Institution : None

Submitted : Ap 26, 1955

The oxides of titanium. N. P. Bogoroditskii, I. E. [illegible] Zelenkova, V. G. Proknvs[illegible]ov, and I. D. Frolberg. Doklady Akad. Nauk S.S.S.R. 104, 513-6(1955).—The titanates of Mg, Ca, Zn, Sr, Cd, Ba, Al, Zr, Pb, Fe, and Ni are of particular interest because of their high [illegible] [illegible] The following systems were investigated [illegible] and $MO \cdot Al_2O_3 \cdot TiO_2$ (M = the above metals [illegible]) [illegible] methods of solid state reactions at the temp. [illegible] 1450°. The ceramic [illegible] were measured in their dielec. consts. [illegible] New compds. found were [illegible] BaO·SiO₂·TiO₂. The complex [illegible] has a neg. temp. coeff. of the dielec. [illegible] the Ba sphene, BaO·SiO₂·TiO₂ [illegible] of only about 1200° and can therefore be [illegible] for ceramic materials used in radiotechniques. A [illegible] classification of the titanates is as follows: [illegible] $MTiO_3$; dititanates, MTi_2O_5, [illegible]; Ba sphene, benitoite, silicotitanates like ramsayite, sphene, Ba sphene, benitoite, leucosphenite etc., aluminotitanates, e.g. $Al_2O_3 \cdot TiO_2$, $CaO \cdot Al_2O_3 \cdot 2TiO_2$, $BaO \cdot Al_2O_3 \cdot 2TiO_2$. W. Eitel

BOGORODITSKIY, N.P., doktor tekhnicheskikh nauk, professor. (Leningrad);
KEYHOV, N.M., kandidat tekhnicheskikh nauk. (Leningrad);
CHERNYAYEV, Yu.S., inzhener (Leningrad).

100 kv gas-filled prototype capacitor. Elektrichestvo no.1:
68-71 Ja '56. (MLRA 9:3)
(Condensers (Electricity))

LEBEDEV, A.A.; TERENIN, A.N.; ARZHANIKOV, N.S.; BOGORODITSKIY, N.P.; YERMOLIN, N.P.; ODINTSOV, G.V.; SOKOLOV, S.Ya.

Professor B.P. Kozyrev. Elektrichestvo no.1:94 Ja '56. (MLRA 9:3)
(Kozyrev, Boris Pavlovich)

BOGORODITSKIY, N.P.; NEYMAN, L.R.; YERMOLIN, N.P.; KAPLYANSKIY, A.Ye.; ODINTSOV, G.V.; KOZYREV, B.P.

A.V. Berendeev. Elektrichestvo no.7:94 Jl '56. (MLRA 9:10)

(Berendeev, Aleksei Viktorovich, d.1955)

ALEKSANDROV, N.V.; BOGORODITSKIY, N.P.; VALEYEV, Kh.S.; VUL, B.M.; DROZDOV, N.G.; KURBATOVA, N.S.; MIKHAYLOV, G.P.; MIKHAYLOV, M.M.; PETROV, G.N.; PRIVEZENTSEV, V.A.; RENNE, V.T.; SKANAVI, G.I.

Professor B.M.Tareev. Elektrichestvo no.8:94 Ag '56. (MLRA 9:10)
(Tareev, Boris Mikhailovich)

BOGORODITSKIY,

SUBJECT	USSR / PHYSICS	CARD 1 / 2	PA - 1599
AUTHOR	Author not mentioned		
TITLE	The Conference on Semiconductor and Nonconductor Technique.		
PERIODICAL	Radiotechnika, 11, fasc.10, 79-80 (1956) Issued: 11 / 1956		

The conference was held at the Leningrad Electrotechnical Institute W.I.ULJANOV (Lenin).

In his lecture on "Semiconductors in Modern Technology" NASLEDOV said that although Russian physicists attained some success in this field, the level of semiconductor technique already attained in other countries has not been attained in Russia.

PETROV spoke about the methods of obtaining super-pure germanium and silicon as well as about a number of new substances with crystalline structure similar to that of germanium and silicon. Among them particularly the antimonide of aluminium is worth mentioning. It will be widely used in devices intended to be used at a surrounding temperature of 350^{o} C. The antimonide of indium will be used in photoelements which are highly sensitive to infrared radiation.

BOGORODICKIJ declared that the use of the titanate of zirconium, of zelsian, and of the stannate of calcium promotes the development of a condenser ceramic with very high thermostable properties, while losses at high dielectric transmissivity are low.

Radiotechnika, 11, fasc.10, 79-80 (1956) CARD 2 / 2 PA - 1599

VERBICKAJA spoke about new types of nonlinear condenser variconds and the range of their application, as i.e. as dielectric amplifiers, in voltage stabilizers, frequency modulators, and similar devices.

OREŠKIN delivered a report on thermistores at high temperatures. He pointed to the possibility of using thermistores of aluminium, oxide, magnesium, and some other materials.

A large number of lectures was devoted to ferrites.

INSTITUTION:

APPROVED FOR RELEASE: 06/09/2000 CIA-RDP86-00513R000205930005-7"

BOGORODITSKIY, N.P.

USSR/Electricity - Dielectrics G-2

Abs Jour : Referat Zhur - Fizika, No 5, 1957, 12112

Author : Bogoroditskiy, N.P., Fridberg, I.D.

Inst : -

Title : Character of the Temperature Dependence of Dielectric Losses in the Polarization of Ionic Compounds.

Orig Pub : Zh. tekhn. fiziki, 1956, 26, No 9, 1884-1889

Abstract : A study was made of the temperature dependence of the dielectric losses (tan δ) at various frequencies, of certain ionic compounds, namely glass (boric anhydride, boron-sodium, boron-barium, commercial alkali-less silicate-barium, and silicate-lead glass) and ceramic materials ("radio" porcelain, steatite, "ultra" porcelain etc.). It is shown, that unlike the prevailing idea of the presence of a region of temperatures in which tan δ retains a constant value, a temperature dependence of tan δ is observed for all the investigated substances.

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USSR/Electricity - Dielectrics G-2

Abs Jour : Ref Zhur - Fizika, No 5, 1957, 12112

The character of this dependence differs for various materials. In connection, with this doubt is raised concerning the advisability of subdividing the losses in ionic compounds, as proposed by T.I. Skanavi, into (a) structural, (b) relaxational, and (c) conduction losses. It is suggested that the dielectric losses can be reduced to the following physical processes:
(1) relaxation during polarization,
(2) relaxation during electric conduction,
(3) ionization of the substance.

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BOGORODITSKIY, N. P.

SUBJECT USSR / PHYSICS CARD 1 / 3 PA - 1381
AUTHOR BOGORODIZKIJ, N.P., FRIEDBERG, I.D., ZWETKOW, N.M.
TITLE On the Problem of Anomalous Polarization in the Polycrystalline Peroxide of Titanium.
PERIODICAL Žurn.techn.fis, 26, fasc. 9, 1890-1901 (1956)
Issued: 10 / 1956 reviewed: 10 / 1956

In connection with contradictions found in literature the authors investigated the influence exercised by admixtures of oxides of the metal groups II., III., and V. on the electric properties of polycrystalline peroxide of titanium. Chemically pure reagents were used as additions of foreign oxides. The samples were mixed in an agate mortar with distilled water, after which they were dried and pressed. The thickness was 1,0 to 1,5 mm. Burning was carried out in electric silican carbide ovens at 1200 to 1450° C in platinum vats. Burnt-in silver layers served as electrodes. The degree of purity was controlled by spectral analysis and structure was controlled by X-ray analysis. One of the basic problems is that of the characteristic of the spectrally pure peroxide of titanium with a permitted low content of admixtures. A table contains the data on the dielectric constant and the tgδ for various frequencies at room temperature as well as for a specific space resistance at 100° C of the titanium peroxide of various brands. A curve represents the dependence of ε and tgδ on temperature. The same was done by further curves for titanium peroxide with various admixtures. These curves show that titanium peroxide with admixtures of Nb_2O_5 and CaO has anomalous electric properties. Additions of Al_2O_3, Fe_2O_3 and ZrO_2 remove these anomalies.

Žurn.techn.fis, 26, fasc.9, 1890-1901 (1956) CARD 2 / 3 PA - 1381

Summary:
1.) Specially purified (spectrally pure) titanium peroxide is characterized by important electric properties within a wide temperature- and frequency range, and possesses no anomalous electric properties.
2.) An anomalous polarization in TiO_2 is found in the cases of additions of CaO and Nb_2O_5, which is connected with the process of partly recomposing the TiO_2 in the presence of these oxides.
3.) An anomalous polarization occurs also in pure titanium peroxide which has no foreign admixtures, namely if it is treated thermally until it attains a light blue color in a reducing atmosphere.
4.) The additions of Al_2O_3 and Fe_2O_3 to titanium peroxide, providing the latter contains Nb_2O_5 or CaO, lead to a considerably lower restoration of TiO_2 because of the compensating effect of the trivalent oxides. In this case no anomalous polarization is observed.
5.) An anomaly of the electric properties of titanium peroxide with admixtures is observed in the case of technical and acoustic frequences. Within the range of radio frequences the tgδ does not increase but is reduced in the case of all compounds.
6.) A carefully carried out X-ray structural analysis of titanium peroxide with admixtures of foreign oxides (Cao, Bao)produced no loosening of the crystalline rutile lattice.

Žurn.techn.fis, 26, fasc.9, 1890-1901 (1956) CARD 3 / 3 PA - 1381

7.) It has been proved by experiment that within the range of sufficiently large concentrations of Fe_2O_3, Nb_2O_5 and Al_2O_3 additions the presence of a phase - that of rutile - becomes noticeable. The solid solution occurs distinctly in addition of Nb_2O_5.

8.) If the low frequences, at which the anomalous processes of polarization in titanium peroxide with admixtures have been observed, are taken into account together with the conductivity of the anomalous TiO_2, it may be assumed that the most probable mechanism of dielectric losses is the electron-relaxation mechanism.

INSTITUTION:

SOV/112-58-2-1866

Translation from: Referativnyy zhurnal, Elektrotekhnika, 1958, Nr 2, p 11 (USSR)

AUTHOR: Bogoroditskiy, N. P.

TITLE: Effect of Temperature on Dielectric Losses of Polarized Ionic Compounds (O kharaktere temperaturnoy zavisimosti dielektricheskikh poter' pri polyarizatsii ionnykh soyedineniy)

PERIODICAL: Izv. Tomskogo politekhn. in-ta, 1956, Vol 91, pp 299-305

ABSTRACT: In connection with drastically increased requirements for electrical properties of high-frequency insulation, a need has arisen for careful study of dielectric losses in ionic compounds at high frequencies. To this end, losses in some borate and silicate simple glasses, and also in some types of H-F ceramics, were studied anew. Experimental data obtained for a wide range of temperatures (from -200° to $+500^{\circ}$C) and frequencies (up to 10^{10} cps) testify, according to the author, that losses in polarization of ionic compounds are due to one phenomenon, viz., disturbance of thermal movement of ions under the influence of electric field. At low frequencies the thermal ionic motion affects the losses in almost the same way it affects the through electric conductance,

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SOV/112-58-2-1866

Effect of Temperature on Dielectric Losses of Polarized Ionic Compounds

which explains the fact that tgδ rises sharply with temperature. As frequency rises, the temperature influence on tgδ decreases. The author suggests abolishing division of dielectric losses into three components (structural, relaxational, and conduction) and considers these components as specific cases of relaxational losses. Basically, dielectric losses could be reduced to the following physical processes: (1) relaxation due to polarization associated with thermal movement of particles; (2) relaxation due to electric conductance also associated with thermal movement of particles; (3) ionization of the substance, usually gas, free or distributed in the solid body which manifests itself in electric fields of higher strength. Bibliography: 5 items. Leningradskiy elektrotekhn. in-t im. V.I. Ul'yanova-Lenina (Leningrad Electrical-Engineering Institute imeni V.I. Ul'yanov-Lenin), Leningrad.

M.D.M.

Card 2/2

AUTHOR BOGORODITSKIY, N.P., BOYS, G.V., KOZLOVSKAYA, M.N., NEYMAN, M.I., PA - 2792

TITLE Mechanical Strenght of Radioceramics in Connection with Heat Treatment. (Mekhanicheskaya prochnost' radiokeramiki v svyazi s termicheskoy obrabotkoy - Russian)

PERIODICAL Zhurnal Tekhn. Fiz., 1957, Vol 27, Nr 4, pp 675-681, (U.S.S.R.)
Received 5/1957 Reviewed 6/1957

ABSTRACT The following three materials mainly used in radio industry were investigated. 1) Ultra porcelain UF-46 on a corundum basis. 2) Ticond T-80 on a rutile basis. 3) Ceramic material on a zirconium-titanate basis TK-20. Crystal sizes were 4 and from 2 to 40 and from 10 to 15 respectively. Measurements of the temperature coefficients of capacity were carried out at a temperature of from 30-70° C and a frequency of 2.10^6 kc. The mechanical strength of radioceramics is closely connected with the forming of a boundary layer between the crystals. This layer has the capability of further crystallization, which leads to the forming of microgaps. Hardening of ceramics at temperatures above the critical temperature for forming gaps is of special importance for the purpose of increasing the mechanical strength. Mechanical and electric strength are closely connected with each other. On the account of the forming of microgaps the electric strength of the ceramics decreases by one order of magnitude. The ceramic materials investigated have a certain critical temperature for the forming of gaps which has to be taken into

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Mechanical Strength of Radioceramics in Connection with Heat Treatment. PA - 2792

account in the case of technological processes. In three chapters the influences exercised by temperature in annealing and cooling down on the properties of the samples are dealt with.
(16 illustrations and 4 citations from Slav publications).

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SUBMITTED 1.11.1956
AVAILABLE Library of Congress
Card 2/2

15(2); 24(2) PHASE I BOOK EXPLOITATION SOV/2007

Bogoroditskiy, Nikolay Petrovich, and Ilariy Dmitriyevich Fridberg

Elektrofizicheskiye osnovy vysokochastotnoy keramiki (Electrical and Physical Principles of High-frequency Ceramics) Moscow, Gosenergoizdat, 1958. 191 p. 5,000 copies printed.

Ed.: V.V. Pasynkov; Tech. Ed.: Ye.M. Soboleva.

PURPOSE: This book is intended for engineers, researchers and technicians dealing with the production and construction of radio components and also for students specializing in this field in vtuzes.

COVERAGE: The authors explain the physical phenomena occurring in dielectrics and semiconductors, especially in radio ceramics, the new high-frequency materials. They discuss the development and production of radio ceramics. They describe physical and chemical processes which accompany the forming of ceramic materials during production and phenomena observed in various high-frequency

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ceramics subjected to an electric field. The authors pay special attention to the operations of producing radio ceramics. The book contains technical and experimental tables and graphs illustrating characteristics and properties of modern ceramic materials and radio components. The book represents a revised version of the book "High-frequency Inorganic Dielectrics" published by the same authors in 1948. In this new edition the authors attempt to summarize the results of 10 years of theoretical research, experimental investigation and production experience. The authors thank the members of the team which worked with them for many years in this field and also F.T. Ponomarev, Ye.A. Gaylish and V.I. Zhukovskiy. There are 89 references: 62 are Soviet, 18 English, 7 German and 2 French.

TABLE OF CONTENTS:

Electrical and Physical Principles (Cont.) SOV/2007

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JP/ad
8-25-59

KORITSKIY, Yu.V., dotsent, kand.tekhn.nauk, laureat Stalinskoy premii, red.; TAREYEV, B.M., prof., doktor tekhn.nauk, laureat Stalinskoy premii, red.; ANDRIANOV, K.A., prof., laureat Stalinskoy premii; red.; BOGORODITSKIY, N.P., prof., doktor tekhn.nauk, laureat Stalinskoy premii, red.; ANTIK, I.V., red.; FRIDKIN, A.M., tekhn.red.

[Manual on materials used in electric engineering; in two volumes] Spravochnik po elektrotekhnicheskim materialam; v dvukh tomakh. Vol.1. [Electric insulation materials] Elektroizoliatsionnye materialy. Pt.1. [Characteristics of materials] Svoistva materialov. Pod obshchei red. IU.V.Koritskogo i B.M.Tareeva. 1958. 460 p. (MIRA 12:4)

1. Chlen-korrespondent AN SSSR (for Andrianov).

(Electric insulators and insulation)

BOGORODITSKIY, N.P.; YERMOLIN, N.P.; FATNYEV, A.V.; VASIL'YEV, D.V.; ODINTSOV, G.V.; GEKTOR, D.S.; APIAKSIN, B.A.

Professor V.A. Timofeev. Elektrichestvo no.2:96 F '58. (MIRA 11:2)
(Timofeev, Vladimir Andreevich, 1897-)

BOGORODITSKIY, N.P., prof.

Professor V.P. Vologdin; on the occasion of the fifth anniversary of his death. Izv. vys. ucheb. zav.; radiotekh. no.2:267-268 Mr-Ap '58. (MIRA 11:5)

1. Direktor Leningradskogo elektrotekhnicheskogo instituta im. V.I. Ul'yanova (Lenina).

(Vologdin, Valentin Petrovich, 1881-1953)

BOGORODITSKIY, N.P.

AUTHOR: Breydo, I. 107-58-3-39/41

TITLE: A Useful Beginning (Poleznoye nachinaniye)

PERIODICAL: Radio, 1958, Nr 3, p 63 (USSR)

ABSTRACT: Recently a series of lectures was held in Leningrad on small-size radio parts. The lectures were organized by NTORiE imeni A.S. Popov. The lectures dealt with materils for producing small-size receivers, capacitors, resistors, transformers, induction coils, printed circuits and technological questions. Some of the most interesting lectures were: "Physics and Technology of Electrotechnical Materials Used in the Manufacture of Radios" by N. Bogoroditskiy; "Capacitors Made of Paper and Tape" by L. Zakgeym; "Non-wire Resistors" by B. Gal'perin ; "Magnetic Materials" by V. Mes'kin. In the reports it was pointed out that there is a tendency to reduce the dimensions of the radio parts. Tantalum capacitors were listed as example for the effort made in this direction. However, there are certain obstac-

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A Useful Beginning

107-58-3-39/41

cles in the development of new, small-size parts. Frequently, such parts are not manufactured immediately after their development is completed, because there are no orders from the consumers who do not know that these parts have been developed. Therefore it is necessary to publish information on new developments in periodicals on electronics, radio engineering, etc.

1. Radio equipment--Miniatureization

Card 2/2

BOGORODITSKIY, N.P.

AUTHORS: ~~Bogoroditskiy, N.P.,~~ Doctor of Technical Sciences, Fridberg, I.D., Candidate of Technical Sciences (Leningrad)

105-58-5-18/28

TITLE: The Physical Processes in Electroceramics and Effective Means of Developing Them (Fizicheskiye protsessy v elektrokeramike i ratsional'nyye puti yeye razvitiya)

PERIODICAL: Elektrichestvo, 1958, Nr 5, pp. 72-73 (USSR)

ABSTRACT: A table shows the basic categories and types of electrotechnical ceramics, and the basic properties of only the ceramics of electric insulation are investigated. It is shown that crystal formations can be subdivided into three types according to the ion-packing in the lattice. The majority of compounds is characterized by a dense ion packing in the lattice and by the electron character of electric conductivity. At the same time, these crystal formations differ according to the energetic spectrum of the forbidden zone. The narrower the band of the forbidden zone, the more do the admixtures of lead influence electric properties and the forming of crystals, and in some cases they even cause considerable deterioration. The 5 mechanisms of the through-going

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The Physical Processes in Electroceramics and Effective Means of Developing Them 105-58-5-18/28

electric conductivity of ion dielectrics, among them also those of electroceramics, are pointed out. Frequently they are superimposed. The experiments carried out by the authors showed that the character of the electric conductivity of ion-dielectrics in ceramics can often be determined in a simple manner by comparing the experimental dependence of the current on time in silver- and platinum- or gold electrodes. This method is based on the fact that, in the case of silver electrodes, a diffusion of silver into the ceramics is observed, whereas in the case of platinum electrodes this is hardly ever the case. A further table gives a classification of dielectric losses in electrotechnical ceramics. The latter table also gives the properties for ceramic working materials as laid down in GOST 5458-57. There are 3 figures, 5 tables, and 4 references, 3 of which are Soviet.

SUBMITTED: September 25, 1957

AVAILABLE: Library of Congress

Card 2/2

1. Insulation (Electric)--Properties 2. Ceramic materials--Electrical properties 3. Crystals--Lattices 4. Silver electrodes--Performance 5. Platinum electrodes--Performance

SOV/110-58-8-2/26

AUTHORS: Professor Bogoroditskiy, N.P. (Doctor of Technical Science), Kirillova, G.K. and Rozentsveyg, S.M. (Engineers)

TITLE: High-strength Ceramic Material for High-voltage Insulators (Keramicheskiy vysokoprochnyy material dlya vysokovol'tnykh izolyatorov)

PERIODICAL: Vestnik Elektropromyshlennosti, 1958, Nr 8, pp 4-6 (USSR)

ABSTRACT: To meet increasing demands for porcelain insulators of good mechanical properties, Corundo-mullite ceramic material KM-1 has been developed, as described in Elektrichestvo, 1954, Nr 7. In chemical, mineralogical and phase composition this material is unlike high-voltage porcelain. The crystalline phase consists of about 70% corundum and mullite. The vitreous phase is similar in chemical composition to $BaO.Al_2O_3.2SiO_2$ and $CaO.Al_2O_3.2SiO_2$. The fired material has a uniform fine grained structure. Production trials on material KM-1 for the manufacture of high-voltage insulators were carried out at the Proletariy Works. The main physical-technical properties of material KM-1 and of high-voltage porcelain are given in Table 1. It will be seen that the mechanical properties

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of KM-1 surpass those of porcelain. The influence of fineness of milling of the materials used in KM-1 is shown in Table 2, with respect to hardening temperature and mechanical strength. As the material becomes coarser the hardening temperature rises and the strength decreases somewhat. Samples of kaolin from three different sources were used as constituents: it was found that the technological characteristics of KM-1 were practically unaffected. Samples fired at temperatures of 1320 - 1380°C were observed to be very strong. The types of high-voltage insulators that were manufactured for production trials are described. Because of the hardness of KM-1, difficulty was experienced in grinding it with the abrasives ordinarily used for ceramics. Glazes normally used for porcelain can be used for KM-1. Hydraulic-pressure tests on the insulators gave good results. The insulators were very strong; brief details of the test results are recorded. The use of material KM-1 is recommended for the manufacture of high-voltage insulators where specially good mechanical properties are required.

There are 2 tables and 1 Soviet reference.

SUBMITTED: April 17, 1958

1. Ceramic materials--Applications

24(6)

AUTHORS: ~~Bogoroditskiy, N. P.~~, Kulik, B. A., Fridberg, I. D. SOV/57-28-10-10/40

TITLE: Dielectric Losses Connected With the Structure of Ionic Crystals and Their Mixtures (Dielektricheskiye poteri v svyazi so strukturoy ionnykh kristallov i ikh smesey)

PERIODICAL: Zhurnal tekhnicheskoy fiziki, Vol 28, Nr 10, 1958 pp 2165 - 2172 (USSR)

ABSTRACT: This paper is limited to an investigation of the component of the dielectric losses which is caused by ions. The authors are of opinion that it is more correct to connect the dielectric losses directly with the crystallochemical features of the crystal lattice, even the more as the lattice energy is determined by just these peculiarities. (This replaces the conception used in papers coming from the Tomskiy politekhnicheskiy institut (Tomsk Polytechnical Institute), of uniquely connecting the dielectric losses with the lattice energy). The purpose of this study was to investigate the di-

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electric losses of a number, as great as possible, of alkali-halide crystals, giving special importance to a series of compounds not investigated in the papers cited by references 1,2,and 3. Mixtures of alkali-halide crystals were also included in the work and their properties were compared with those of several silicate- and titanium- containing systems. Summary: 1) The nature of the tg δ versus concentration, versus temperature and frequency, and versus time functions may be regarded to constitute one of the criteria serving in the estimation of the interaction of components and of structural transformations of the system. 2) When polarization by ionic relaxation is considered the dielectric losses are determined by the defects in the crystal lattice. These defects are not taken into account by the formula for the lattice energy. Hence tg δ in a great number of alkali halide crystals does not correspond to the lattice energies. 3) The processes of formation and of decomposition of solid solutions of ionic crystals are one of the

Dielectric Losses Connected With the Structure of Ionic Crystals and Their Mixtures

SOV/57-28-10-10/40

causes of instability of the properties of technical dielectrics. There are 9 figures, 3 tables, and 13 references, 11 of which are Soviet.

SUBMITTED: May 5, 1958

Card 3/3

AUTHORS: Bogoroditskiy, N. P., Volokobinskiy, Yu. M., Fridberg, I. D. SOV/20-120-3-13/67

TITLE: The Electric Properties of a Dielectric With a Variable Number of Relaxers (Elektricheskiye svoystva dielektrika s peremennym chislom relaksatorov)

PERIODICAL: Doklady Akademii nauk SSSR, 1958, Vol. 120, Nr 3, pp. 487-490 (USSR)

ABSTRACT: The various conditions of the dependence of the amount of relaxation polarization on the time necessary for it to commence are discussed first. If the field in the dielectric changes sinusoidally with the circuit frequency as time progresses, the dielectricity constant ε may for a given frequency be less than that which the dielectric would have in a constant field. An expression is given for the frequency at which the dependence of $tg\delta$ upon ω has a maximum. The relaxation time τ is assumed exponentially to depend on the temperature. The voluminous experimental material available shows that the temperature maximum of $tg\delta$, which is predicted by the theory, can in some cases not be determined experimentally. The discrepancy between theory and experiment mentioned in this paper is due to the simplifying assumption that the number of relaxers is independent of temperature. However, experimental data favor an increased number of

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relaxers in the case of a temperature increase. According to Skanavi (Ref 1) the ions are in a "consolidated" state at low temperature, from which state they can be liberated when the dielectric is heated. The authors here investigate the case in which the number of relaxers increases with rising temperature. First, it is assumed that the dependence of relaxation polarization P on the temperature T in a constant field is determined by the formula $P = P_o e^{-U/kT}$. Here U denotes the relaxation energy of the relaxer and P_o - a constant. The aforementioned assumption is replaced by the more complete assumption $\kappa = \kappa_o e^{-U/kT}$, where κ_o denotes a constant. If the number of relaxers increases with rising temperature, the temperature maximum of $tg\delta$ is found to occur at a higher temperature than if the number of relaxers is constant. In some cases the reduction of the number of relaxers with increased temperature may have the follwoing consequences: a) Increase of the dielectric constant in the case of rising temperature. b) Lacking maximum of $tg\delta$ during the course taken by the temperature $tg\delta$. c)Increase of the maximum of $tg\delta$ during

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The Electric Properties of a Dielectric With a Variable Number of Relaxers SOV/20-120-3-13/67

the course taken by the temperature of tgδ in the case of an increase of frequency. There are 5 references, 5 of which are Soviet.

ASSOCIATION: Leningradskiy elektrotekhnicheskiy institut im.V.I.Ul'yanova (Lenina)(Leningrad Institute of Electrical Engineering imeni V.I.Ul'yanov (Lenin))

PRESENTED: February 20, 1958, by A.F.Ioffe, Member, Academy of Sciences, USSR

SUBMITTED: February 18, 1958

1. Dielectrics--Electrical properties 2. Dielectrics--Temperature factors 3. Dielectrics--Polarization 4. Mathematics--Applications

Card 3/3

CHERNYAK, Konstantin Isaakovich; BOGORODI[redacted] prof., nauchnyy red.; APTEKMAN, M.A., red.; KRA[redacted] tekhn.red.

[Epoxy compounds and their use] Epoksidnye kompaudy i ikh primenenie. Leningrad, Gos.soiuznoe izd-vo sudostroit.promyshl., 1959. 132 p. (MIRA 12:9)

(Resins, Synthetic) (Electric engineering--Materials)

ANDRIANOV, K.A., obshchiy red.; BOGORODITSKIY, N.P., obshchiy red.; KORITSKIY, Yu.V., obshchiy red.; TAREYEV, B.M., obshchiy red.; ANTIK, I.V., red.; FRIDKIN, A.M., tekhn.red.

[Handbook on electrical engineering materials in two volumes] Spravochnik po elektrotekhnicheskim materialam v dvukh tomakh. Moskva, Gos.energ.izd-vo. Vol.1. [Electrical insulation materials] Elektroizoliatsionnye materialy. Pt.2. [Methods of testing and use of materials] Metody ispytaniia i primeneniia materialov. Pod obshchei red. IU.V.Koritskogo i B.M.Tareeva. 1959. 476 p. (MIRA 12:9)

(Electric insulators and insulation)

BOGORODITSKIY, N.P.; REYNOV, N.M.; ALEKSANDROV, L.A.

Temperature dependence of TK_{ε} of the compound $CaZrO_3$ at liquid helium temperatures. Fiz. tver. tela 1 no.2:350-352 F '59. (MIRA 12:5)

(Calcium zirconate--Electric properties)
(Low temperature research)

15(2) SOV/72-59-11-10/18

AUTHORS: Bogoroditskiy, N. P., Polyakova, N. L., Eydel'kind, A. M., ~~Prokhvatilov, V. G.,~~ Petrova, V. P.

TITLE: Wollastonite Raw Materials for the Ceramics Industry

PERIODICAL: Steklo i keramika, 1959, Nr 11, pp 32-38 (USSR)

ABSTRACT: In the Tadzhikskaya and Uzbekskaya SSR, rich deposits of this mineral have recently been found. Wollastonite $CaO \cdot SiO_2$ consists of 48.25% CaO and 51.75% SiO_2. As can be seen from the paper by D. S. Belyankin, V. V. Lapin, N. N. Toropov (Footnote 1), K. K. Kolobova in 1941 investigated the system $CaO-SiO_2$. Wollastonite has hitherto not been used in Soviet industry. The authors of the present paper studied the wollastonite rocks of the following three deposits: Kansay (Tadzhikskaya SSR), Lyangar (Uzbekskaya SSR), and Kalkkitekhdasskiy (Leningrad oblast'). According to the papers by M. Z. Kantor, V. P. Petrov (Footnote 2), this rock contains small quantities of diopside, garnet, quartz, and calcite. The chemical analysis of the wollastonite rocks of the three deposits is given in table 1. The results of the radiographical and microscopical

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investigations, as well as the investigation of the electric conductivity, are listed in table 2 for natural wollastonite, and in table 3 for synthesized wollastonite. Table 1 shows the dependence of the inclination tangent of the dielectric losses on the burning temperature of the raw materials. Figures 2-5 show microphotographs of wollastonite rocks and synthesized wollastonite, while figures 6-8 show X-ray pictures of these wollastonites. Furthermore, the electric and physico-mechanical properties of radioceramic materials made of wollastonite are given. Figure 9 represents the results of comparative examinations of the heat resistance of samples of steatite material and wollastonite. As can be seen from these results, the heat resistance of the wollastonite samples is much higher. Investigations showed that the wollastonite rocks from the Kansay and Lyangar deposits can be used as a raw material for the production of electrotechnical and other types of ceramics. There are 9 figures and 3 references, 2 of which are Soviet.

8(0) SOV/105-59-12-20/23

AUTHORS: Alekseyev, A. A., Bogoroditskiy, N. P., Glebov, I. A., Dembo, A. R., Drozdov, N. G., Kapitsa, P. L., Kulebakin, V.S., Neyman, L. R., Syromyatnikov, I. A., et al

TITLE: Academician M. P. Kostenko. On His 70th Birthday and the 40th Anniversary of His Scientific and Pedagogic Activity

PERIODICAL: Elektrichestvo, 1959, Nr 12, pp 81 - 82 (USSR)

ABSTRACT: The oldest member of the editorial staff of the periodical "Elektrichestvo", Mikhail Poliyevktovich Kostenko was born the son of a physician in the District Voronezh in 1889. He studied at the Peterburgskiy universitet (St. Peterburg University) in 1907, in 1908 at the Peterburgskiy elektrotekhnicheskiy institut (St. Peterburg Institute of Electrical Engineering) was relegated in 1910, because of participation in a students' revolt and exiled to the Perm' District. 1911 - 1913 he worked there as a telephone mechanic. 1913-1918 he studied and graduated from the Peterburgskiy politekhnicheskiy institut (St. Peterburg Polytechnic Institute). In 1920 he was elected instructor for the Chair of Electrical Machines at the same institute. 1922 - 1924 Kostenko was sent

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Academician M. P, Kostenko. On His 70th Birthday and SOV/105-59-12-20/23
the 40th Anniversary of His Scientific and Pedagogic Activity

to England as an engineer and made several inventions (pulse generator, commutator generator etc). He again started working at the Leningradskiy politekhnicheskiy institut im. Kalinina (Leningrad Polytechnic Institute imeni Kalinin) in 1924, where he became docent in 1927, and professor and head of the Chair of Electrical Machines in 1930. Since 1924 he also, worked at the "Elektrosila" Works as an engineer. He took part in the development of the new turbogenerator series from 1927 to 1930. His book "AC-Commutators" appeared in 1933. In 1935 - 1936 he worked as chief electrical engineer at the Khar'kovskiy elektromekhanicheskiy zavod (Khar'kov Electromechanical Plant). He then returned to the Leningrad Polytechnic Institute. In 1939 he was elected Corresponding Member of the AS USSR. Subsequently he worked in the komissiya otdeleniya tekhnicheskikh nauk AN SSSR po vyboru sistemy toka dlya elektrifikatsii zheleznykh dorog SSSR (Commission of the Department of Technical Sciences of the AS USSR for the current type selection for the electrification of railroads in the USSR). 1942-1944 a large-size mercury rectifier plant was installed within the system of the Uzbekenergo under

Card 2/3

Academician M. P. Kostenko. On His 70th Birthday and the SOV/105-59-12-20/23
40th Anniversary of His Scientific and Pedagogic Activity

his supervision. This work served as basis for the book published in 1946 together with L. R. Neyman and G. N.Blavdzevich "Elektromagnitnnyye protsessy v sistemakh s moshchnymi vypryamitel'nymi ustanovkami" (Electromagnetic Processes in Systems With Large-size Rectifier Installations). During the same time and under his supervision, the simulation of large-power systems by means of special machines was developed. He returned to the Leningradskiy politekhnicheskiy institut (Leningrad Polytechnic Institute) in 1944. In 1958 he received the Lenin prize. He is member of the GNTK at the Sovet Ministrov SSSR (Council of Ministers, USSR), member of the technical council at the "Elektrosila" Plant and at the Institut postoyannogo toka (D.C.-Institute), delegate of the Verkhovnyy Sovet SSSR (Supreme Soviet of the USSR), member of the Presidium of the AS USSR and its representative in Leningrad. There is 1 figure.

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BOGORODITSKIY, N.P., prof., doktor tekhn.

Foreword. Izv. LETI no.38:5-6 '59. (MIRA 13:8)

1. Direktor Leningradskogo Elektrotekhnicheskogo Instituta im. V.I. Ul'yanova (Lenina).
(Popov, Aleksandr Stepanovich, 1859-1906)

APPROVED FOR RELEASE: 06/09/2000 CIA-RDP86-00513R000205930005-7"

PHASE I BOOK EXPLOITATION SOV/5058

Bogoroditskiy, N. P., and V. V. Pasynkov, eds.

Spravochnik po elektrotekhnicheskim materialam. V dvukh tomakh. t. 2; Magnitnyye, provodnikovyye, poluprovodnikovyye i drugiye materialy (Handbook on Electrical Engineering Materials. In two volumes. Vol. 2; Magnetic, Conducting, Semiconducting, and Other Materials) Moscow, Gosenergoizdat, 1960. 511 p. Errata slip inserted. 30,000 copies printed.

Eds. of Handbook: K. A. Andrianov, N. P. Bogoroditskiy, Yu. V. Koritskiy, V. V. Pasynkov, and B. M. Tareyev; Eds. (This vol.): N. P. Bogoroditskiy and V. V. Pasynkov; Tech. Ed.: Ye. M. Soboleva.

PURPOSE: This handbook is intended for technical personnel of electrical and radio engineering establishments, power stations and substations, electric repair shops, laboratories, and scientific research institutes.

Card 1/19

COVERAGE: This volume of the handbook contains basic information on magnetic materials, metallic conductors, electrical carbon, and important electrolytes used in modern engineering. It describes characteristics of semiconductor, ferroelectric, and piezoelectric materials. It does not include insulating materials, which were covered in Volume I. The authors thank the scientists associated with the Department of Dielectrics and Semiconductors of the Leningradskiy elektrotekhnicheskiy institute imeni V. I. Ul'yanova (Lenina) [Leningrad Electrotechnical Institute imeni V. I. Ul'yanov (Lenin)], especially Ya. I. Panov, Candidate of Technical Sciences, R. K. Manakov and R. P. Voylochnikov, assistants, and G. I. Panteleyev and O. M. Kornev for their assistance. References accompany each part.

ANDRIANOV, K.A., red.; BOGORODITSKIY, N.P., red.; KORITSKIY, Yu.V., red.; PASYNKOV, V.V., red.; TAREYEV, B.M., red.; SOBOLEVA, Ye.M., tekhn.red.

[Handbook on electric engineering materials; in two volumes] Spravochnik po elektrotekhnicheskim materialam v dvukh tomakh. Moskva, Gos.energ.izd-vo. Vol.2. [Magnetic, conducting, semiconductor and other materials] Magnitnye, provodnikovye, poluprovodnikovye i drugie materialy. Pod red. N.P.Bogoroditskogo i V.V.Pasynkova. 1960. 511 p. (MIRA 14:1)
(Electric engineering--Materials)

BOGORODITSKIY, N.P.

Vsesoyuznaya konferentsiya po fizike dielektrikov. 2d, 1958

Fizika dielektrikov, trudy vtoroy vsesoyuznoy konferentsii (Physics of Dielectrics, Transactions of the 2d All-Union Conference on the Physics of Dielectrics) Moscow, Izd-vo AN SSSR, 1960. 532 p. Errata slip inserted. 5,000 copies printed.

Sponsoring Agency: Akademiya nauk SSSR. Fizicheskiy institut imeni P.N. Lebedeva.

Ed. of Publishing House: Ye.L. Starokadomskaya; Tech. Ed.: I.M. Dorokhina; Editorial Board: (Resp. Ed.) G.I. Skanavi, Doctor of Physics and Mathematics (Deceased), and K.V. Filippova, Candidate of Physics and Mathematics.

PURPOSE: This collection of reports is intended for scientists investigating the physics of dielectrics.

COVERAGE: The Second All-Union Conference on the Physics of Dielectrics held in Moscow at the Fizicheskiy institut imeni P.N. Lebedeva (Physics Institute imeni P.N. Lebedev) in November 1958 was attended by representatives of the principal scientific centers of the USSR and of several other countries. This collection contains most of the reports presented at the conference and summaries of the discussions which followed. The reports in this collection deal with dielectric properties, losses, and polarization, and with specific inductive capacitance of various crystals, chemical compounds, and ceramics. Photoelectrets, ferroelectric crystals, and various radiation and irradiation effects on dielectrics are investigated. The volume contains a list of other papers presented at the conference dealing with polarization, losses, and breakdowns of dielectrics, which were published in the journal Izvestiya AN SSSR, seriya fizicheskaya, Nos. 1 and 2, 1960. No personalities are mentioned. References accompany each report.

BOGORODITSKIY, N.P., doktor tekhn.nauk, prof.

Higher technical education in the United States. Izv.vys.ucheb. zav.; radiotekh. 3 no.1:124-129 Ja-F '60. (MIRA 13:8)

1. Direktor Leningradskogo elektrotekhnicheskogo instituta im. V.I.Ul'yanova (Lenina).
(United States--Technical education)

S/105/60/000/07/26/027
B007/B005

AUTHORS: Bogoroditskiy, N. P., Syromyatnikov, I. A., Fedoseyev, A. M., Atabekov, G. I., Yermolin, N. P., Ryzhov, P. I., Timofeyev, V. A., and Others

TITLE: Professor V. I. Ivanov (On His 60th Birthday)

PERIODICAL: Elektrichestvo, 1960, No. 7, pp. 94-95

TEXT: This is a short biography of Viktor Ivanovich Ivanov born in April 1900 at Penza as the son of an engine driver. He is Doctor of Technical Sciences and Professor at the Leningradskiy elektro-tekhnicheskiy institut im. Ul'yanova (Lenina)(Leningrad Electro-technical Institute imeni Ul'yanov (Lenin)). He finished his secondary school education in 1918, and enrolled at the fiziko-matematicheskiy fakul'tet Saratovskogo universiteta (Department of Physics and Mathematics at Saratov University), and in 1921 at the Leningrad Electrotechnical Institute imeni Ul'yanov (Lenin) from which he graduated in the special subject of electric power plants in 1927. He started his pedagogical activity at the same institute under the

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supervision of A. A. Smurov in the same year, and conducted - at the same time - the investigations of protective relays at the Leningradskaya energosistema (Leningrad Power Network). Under the supervision of R. A. Lyuter and together with P. I. Ryzhov, he established a laboratory for protective relays at the same institute, and was among the first in the USSR to give lectures on protective relays and short-circuit currents. At the same time, he organized - at Lenenergo together with P. I. Ryzhov - the first service for protective relays in the USSR. His book on this field was published in 1932. From 1932 to 1941, he conducted the department of protective relays at the laboratory of A. A. Smurov. He developed a carrier-current protection for transmission lines, and under his supervision the laboratoriya im. Smurova (Laboratory imeni Smurov) installed 40 such sets at the Mosenergo, Lenenergo, Donbassenergo, and Uralenergo. During the first war years, he worked in the Ural, and besides, lectured at the Ural'skiy politekhnicheskiy institut (Ural Polytechnic Institute) and the Lesotekhnicheskiy institut (Forest Technology Institute). In 1944-47 he lectured at the Akademiya im. Zhukovskogo (Academy imeni Zhukovskiy) and the Moskovskiy aviatsionnyy institut im. Ordzhonikidze (Moscow Aviation Institute imeni Ordzhonikidze).

Professor V. I. Ivanov (On His 60th Birthday) S/105/60/000/07/26/027
B007/B005

In 1947 he returned to the Leningrad Electrotechnical Institute, and conducted the kafedra tekhniki vysokikh napryazheniy (Chair of High Voltage) which he transformed to the kafedra moshchnykh vysokovol'tnykh preobrazovatel'nykh ustroystv promyshlennykh i impul'snykh ustanovok (Chair of Large High-voltage Rectifying Devices for Industrial and Pulse Apparatus) in 1956. At the same time, he cooperated in the investigations of the Nauchno-issledovatel'skogo instituta postoyannogo toka (Direct Current Scientific Research Institute) and the Institut elektromekhaniki AN SSSR (Institute of Electromechanics AS USSR). In 1936, he became a Docent and Candidate of Technical Sciences, in 1943 Doctor of Technical Sciences and Professor. His thesis was entitled: "Generalized Theory of Lines". There is 1 figure.

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5.4600 (A)
24.2400

S/057/60/030/06/16/023 81595
B012/B064

AUTHORS: Aleksandrov, L. A., Bogoroditskiy, N. P., Lisker, K. Ye., Fridberg, I. D.

TITLE: On the Temperature Dependence of the Dielectric Constant of the Ion Dielectrics in a Wide Temperature Range

PERIODICAL: Zhurnal tekhnicheskoy fiziki, 1960, Vol.30, No.6, pp.699-704

TEXT: With reference to the papers (Refs. 1, 2) investigations are described of a series of clear crystalline phases and their mixtures as applied in radio ceramics. The purpose of these investigations was to obtain further data on the character of the temperature dependence of the temperature coefficient TKε of the dielectric constant in a wide temperature range. The ceramics which were investigated are listed and the production of the samples and the mode of the experiments is described. Since in many dielectrics ε varies strongly with temperature, TKε was calculated in every case for a narrow range of temperature of 15 + 20°C. This coefficient has the symbols TKε_d (d = differential). The data obtained by the experiment are given and discussed. Fig. 2 gives the temperature dependences of the

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On the Temperature Dependence of the Dielectric Constant of the Ion Dielectrics in a Wide Temperature Range

S/057/60/030/06/16/023 81595
B012/B064

investigated compounds in the range of (-150) + (+150)°C. It is seen that for most of the ion dielectrics (polycrystalline ceramics, glasses, mica) $TK\varepsilon_d$ decreases with a drop in temperature, but in some cases (calcium stannate, calcium zirconate) a minimum of $TK\varepsilon_d$ is observed. Those dielectrics in which $TK\varepsilon$ is subject to a particularly strong change (up to 2.5 - 3 times) can be divided into two groups. These are explained in detail. On the basis of the investigations made it can be assumed that in the various ceramic dielectrics a relaxation polarization at low temperatures exists, i.e., in ceramic dielectrics with and without titanic dioxide. The paper by V. A. Ioffe (Ref. 6) is mentioned. There are 7 figures and 6 references: 3 Soviet and 3 English.

SUBMITTED: December 18, 1959

4/1

Card 2/2

PHASE I BOOK EXPLOITATION SOV/5389

Bogoroditskiy, Nikolay Petrovich, and Vladimir Vasil'yevich Pasynkov

Materialy v radioelektronike (Materials in Radio Electronics) Moscow, Gosenergoizdat, 1961. 352 p. 45,000 copies printed.

Ed.: Ya. I. Panova, Candidate of Technical Sciences; Tech. Ed.: Ye. M. Soboleva.

PURPOSE: This book has been approved by the Ministry of Higher and Secondary Special Education, RSFSR, as a textbook for radio engineering schools of higher education and university divisions. It may be also useful to technical personnel engaged in radio electronics.

COVERAGE: The book presents the principles of the phenomena occurring in insulating, semiconductor, conductor, and magnetic radiotechnical materials. Their electrical properties, especially at elevated and high frequencies, and their

Card 1/6

physicochemical and mechanical characteristics are described. The production technology of numerous radiotechnical materials and their use in the manufacture of articles and components used in radio engineering are briefly examined. The authors thank the following persons: D. N. Nasledov, Professor, Head of the Department of Physics of the Leningradskiy politekhnicheskiy institut im. M. I. Kalinina (Leningrad Polytechnical Institute imeni M. I. Kalinin); A. N. Tekuchev, Professor, head of the committee of teachers of the Ryazanskiy radiotekhnicheskiy institut (Ryazan' Institute of Radio Engineering), who reviewed the book; and G. I. Panteleyeva, who helped with the manuscript. There are 25 references, all Soviet (including 2 translations).

TABLE OF CONTENTS:

BOGORODITSKIY, Nikolay Petrovich; PASYNKOV, Vladimir Vasil'yevich; TAREYEV, Boris Mikhaylovich; RENNE, V.T., doktor tekhn.nauk, prof., red.; ZHITNIKOVA, O.S., tekhn.red.

[Electric engineering materials] Elektrotekhnicheskie materialy. Izd.4., perer. Moskva, Gos.energ.izd-vo, 1961. 528 p. (MIRA 14:6)

1. Zaveduyushchiy kafedroy elektroizolyatsionnoy i kabel'noy tekhniki Leningradskogo politekhnicheskogo instituta im. M.I.Kalinina (for Renne).

(Electric engineering—Materials)

33130

9.2110 (1001,1153,1385)

S/105/61/000/012/004/006
E194/E455

AUTHORS: Bogoroditskiy, N.P., Doctor of Technical Sciences, Professor; Volokobinskiy, Yu.M., Candidate of Technical Sciences, Docent; Fridberg, I.D., Candidate of Technical Sciences

TITLE: A semi-graphical method of calculating the thermal breakdown voltage of high-frequency insulators

PERIODICAL: Elektrichestvo, no.12, 1961, 63-68

TEXT: A semi-graphical method is proposed to overcome the mathematical difficulties of calculating the thermal breakdown voltage of insulators and capacitors, particularly ceramics. It is assumed that K (the thermal conductivity of the dielectric), ε (its permittivity) and tan δ are given as simple functions of coordinates and temperature. In many practical cases the insulator can be represented as a sheet of material with a uniform electric field applied parallel to a face of the sheet. One side of the sheet is ideally thermally insulated and the other is exposed to air, so that heat flow is perpendicular to the surface and to the electric fields. An element of unit surface area within the insulator is considered. An expression is derived

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for the heat evolved in this element and it is equated to an expression for the heat dissipated from the outer surface of the element in contact with air. A graph is plotted (Fig.4) of η as a function of temperature, where η differs from the electrical conductivity of the material by a constant factor and is given by the expression

$$\eta = \frac{\varepsilon \, \mathrm{tg}\, \delta f}{1.8 \cdot 10^{+6}} \quad (\mathrm{W/cm\ kV^2}) \qquad (18)$$

where f is the frequency. From a point in the abscissus corresponding to ambient air temperature T_A, a tangent is drawn to intersect the curve at the point T^{*}. Then the temperature of the hottest point in the element at the instant of breakdown lies between T^{*} and T^{**} where $\psi = T^{*} - T_A$; $\Theta = (\lambda/K)D$ (λ - external heat transfer coefficient; D - thickness). A graph is then plotted of surface temperature T_n as a function of applied field strength E to find the point on the curve corresponding to the maximum surface temperature T_{nnp} (see Fig.5). Then the maximum surface temperature at breakdown T_{nnp} is

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A semi-graphical method of ... S/105/61/000/012/004/006
E194/E455

calculated within certain limits in a manner similar to that used to determine the maximum temperature in the specimen. The temperature difference between the hottest spot and the surface can then be determined within certain limits. The heat dissipated from unit surface at a voltage near to breakdown is found and then the electric field strength is determined that causes this amount of heat to be evolved, which is the value required to be found. The method can be applied to insulators that are air-cooled on both sides by considering them to be of half thickness; it can also be applied to cylindrical ceramic insulators in a uniform field provided the radius is great compared with the wall thickness. Its application to more difficult cases is discussed. A worked example on a simple case shows that the accuracy suffices for practical purposes. A number of general conclusions are drawn about the relationship between the variables involved in cases of thermal breakdown of this kind. M.I.Mantrov is mentioned in the article in connection with his contributions in this field. There are 6 figures and 11 references - all Soviet-bloc.

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33130
S/105/61/000/012/004/006
E194/E455

ASSOCIATION: Leningradskiy elektrotekhnicheskiy institut im. V.I.Ul'yanova (Lenina) (Leningrad Electrotechnical Institute im. V.I.Ul'yanov (Lenin))

SUBMITTED: August 11, 1961

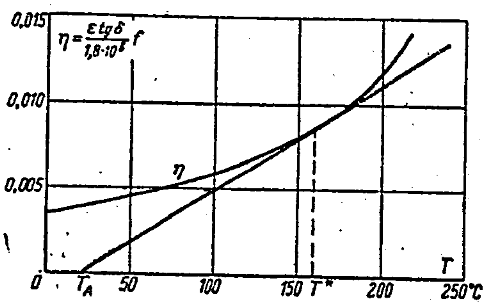

Fig.4.

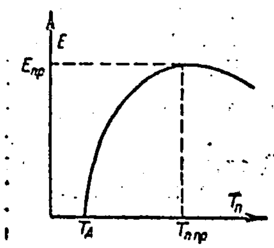

Fig.5.

S/181/62/004/009/011/045
B108/B186

AUTHORS: Bogoroditskiy, N. P., Mityureva, I. A., and Fridberg, I. D.

TITLE: Effect of the covalent bond in a titanium dioxide crystal on the magnitude of its dielectric constant

PERIODICAL: Fizika tverdogo tela, v. 4, no. 9, 1962, 2393 - 2396

TEXT: The rutile type crystals TiO_2 and SnO_2 are studied, the first mentioned having a highly anisotropic dielectric constant. The arrangement of the nearest neighbors of Ti and Sn in the lattice and their electron configurations show that there is a plane covalent bond in TiO_2 but not in SnO_2. A model of polarization is proposed for TiO_2 in which the elastic forces do not shorten the interionic distance (below 1.944 Å) in the Ti-O bond when an external field is applied. This is due to the covalent bond. The O-O bonds, however, are expanded within each molecule, which leads to a displacement of the $\overset{\text{Ti}}{\text{/\textbackslash}}$ O-O group as a whole. The anisotropy of the dielectric

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APPROVED FOR RELEASE: 06/09/2000 CIA-RDP86-00513R000205930005-7"

Effect of the covalent bond in... S/181/62/004/009/011/045
B108/B186

constant in TiO_2 ($\varepsilon_{\parallel}$ = 173, $\varepsilon_{\perp}$ = 89) also is due to the covalent bond. There are 3 figures.

ASSOCIATION: Leningradskiy elektrotekhnicheskiy institut im. V. I. Ul'yanova (Lenina) (Leningrad Electrotechnical Institute imeni V. I. Ul'yanov (Lenin))

SUBMITTED: April 9, 1962

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44165

S/181/62/004/012/010/052
B104/B102

15.2650

AUTHORS: Bogoroditskiy, N. P., and Smirnov, L. V.

TITLE: Problem of the anomalous polarization of titanium dioxide (rutile)

PERIODICAL: Fizika tverdogo tela, v. 4, no. 12, 1962, 3418-3421

TEXT: In studies of the anomalous polarization of rutile ceramics (G.I. Skanavi and A.I. Demeshina, ZhETF, XIX, 3, 949; Ya.M. Ksendzov, ZhTF, XX, 1, 117, 1950; L.I. Reymerov, ZhTF, XXVI, 3, 1960; Ya.M. Ksendzov, Izv. AN SSSR, ser. fiz., 22, 3, 287, 1958) the ohmic conductivity was assumed to be low enough in comparison with the capacitive component for it to be neglected. Here the correctness of this assumption is checked. The electric properties (ε, $\tan\delta$, ε_{eff}) of identically prepared TiO_2 specimens containing Nb_2O_5 impurities, with Ag-Ag and Ag-In electrodes, as well as the volt-ampere characteristic of the Ag-TiO_2 contacts were investigated. It became evident that the high-resistance contact layers must be considered. What are called the anomalous effects are attributed

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to nonuniform structure of the specimens in connection with thin layers of high resistance close to the electrodes. This property enables rutile ceramics to be used for producing capacitors of high specific capacity. A distinct asymmetry of the blocking layer conductivity makes it possible to use rutile for the production of ceramic valves. There are 4 figures and 1 table.

ASSOCIATION: Leningradskiy elektrotekhnicheskiy institut im. V.I. Ul'yanova-Lenina (Leningrad Electrotechnical Institute imeni V.I. Ul'yanov-Lenin)

SUBMITTED: July 3, 1962

S/020/62/144/004/011/024
B125/B104

9,2000

AUTHORS: Bogoroditskiy, N. P., and Volokobinskiy, Yu. M.

TITLE: Theory of thermal breakdown of dipole dielectrics

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 144, no. 4, 1962, 766-769

TEXT: The authors calculate the field strength at which thermal breakdown occurs in insulators and capacitors, using a graphic-analytical method. If the specimens are small enough and if the alternating electric field is uniform the evolution of heat also is uniform. The breakdown field strength of the dipole dielectrics is $E_{br} = \sqrt{\lambda(T^* - T_A)S/\eta^* V}$ (5), where λ is the coefficient of external heat delivery which is assumed constant; T^* is the temperature of the unstable thermal equilibrium, T_A is the temperature of the surrounding air, η^* is the value of $\eta = \varepsilon \tan\delta \cdot f/1.8 \cdot 10^{12}$ at T^*, S is the surface area of the specimen and V is its volume. The breakdown voltage in a uniform field is $U_{br} = E_{br}L$, where L is the minimum inter-electrode distance. In an inhomogeneous field, the

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voltage at thermal breakdown is $U_{br} = \sqrt{\lambda(T^* - T_A)S/2\pi fC \tan\delta}$ (6), C and $\tan\delta$ being respectively the capacity and the tangent of the loss angle of the capacitor (insulator) at temperature T*. The formulas (5) and (6) hold also for dielectrics with a weak relaxation polarization. In order to calculate the voltage at thermal breakdown for large insulators or capacitors the temperature distribution in the dielectric must be known. The breakdown field strength of a plane-parallel plate made of a dielectric with a distinct relaxation polarization is $E_{br} = (E' + E'')/2$ with

$$E' = \sqrt{\frac{4\lambda}{1+\lambda D/2K}\frac{(T^* - T_A)}{(\eta^* + \eta_m)D}} \quad (12)$$ and $$E'' = \sqrt{\frac{8\lambda}{4+\lambda D/2K}\frac{(T^* - T_A)}{\eta^* D}} \quad (15).$$

This result either is accurate enough for practical purposes or can be used as a basis of numerical calculations. There are 3 figures.

ASSOCIATION: Leningradskiy elektrotekhnicheskiy institut im. V. I. Ul'yanova-Lenina (Leningrad Electrotechnical Institute imeni V. I. Ul'yanov-Lenin)

Theory of thermal breakdown ... S/020/62/144/004/011/024
B125/B104

PRESENTED: January 18, 1962, by B. P. Konstantinov, Academician

SUBMITTED: January 15, 1962

Card 3/3

ALEKSEYEV, A.Ye.; BASHARIN, A.V.; BOGORODITSKIY, N.P.; VASIL'YEV, D.V.; IVANOV, V.I.; LYUTER, R.A.; MANOYLOV, V.Ye.; YERMOLIN, N.P.; FRAMKE, A.V.

Vladimir Tikhonovich Kas'ianov; on the seventy-fifth anniversary of his birth and the tenth anniversary of his death. Elektrichestvo no.4:95 Ap '62. (MIRA 15:5)
(Kas'ianov, Vladimir Tikhonovich, 1887-1952)

CHERNYAK, Konstantin Isaakovich; SHTRAYKHMAN, G.A., kand. tekhn. nauk, retsenzent; BOGORODITSKIY, N.P., prof., nauchnyy red.; APTEKMAN, M.A., red.; FRUMKIN, P.S., tekhn. red.

[Epoxy compounds and their use] Epoksidnye kompaundy i ikh primenenie. Izd.2., perer. i dop. Leningrad, Sudpromgiz, 1963. 254 p. (MIRA 16:5)

(Epoxy resins)

(Electric insulators and insulation)

BR

AM4036541 BOOK EXPLOITATION S/

Bogoroditskiy, Nikolay Petrovich; Kal'mens, Natan Vladimirovich; Neyman, Moisey Isakovich; Polyakova, Natal'ya Lavrent'yevna; Rotenberg, Boris Abovich; Salitra, Dmitriy Borisovich; Afanas'yeva, Margarita Aleksandrovna; Fridberg, Illariy Dmitriyevich

Radioceramics (Radiokeramika). Moscow, Gosenergoizdat, 1963. 553 p. illus., biblio. 7000 copies printed.

TOPIC TAGS: electrical ceramic, electrical insulator, ceramic radio component, ceramic fabrication process

PURPOSE AND COVERAGE: This handbook is intended for technical personnel in the electrical-ceramics industry. It may also be used as a manual for students in higher polytechnical schools specializing in radio components and materials. The text covers the physicochemical and mechanical principles underlying the manufacture of ceramic radio components and gives a detailed description of all stages of production, including process flow sheets, GOST specifications, apparatus designations, and a classification of ceramic materials used in radio engineering. Modernization of the manufacturing

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AM4036541

processes, new materials, and automation are also mentioned. This book is the first Soviet handbook for the new "radio-ceramics" industry.

TABLE OF CONTENTS [Abridged]:

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AM4036541

PART III. FORMING OF BLANKS FOR RADIO PARTS

PART IV. FIRING OF CERAMIC RADIO PARTS

AM4036541

PART V. MACHINING OF FIRED RADIO-CERAMIC PRODUCTS

SUB CODE: MT SUBMITTED: 18May63 NO REF SOV: 208

OTHER: 043 DATE ACQ: 06Apr64

BOGORODITSKIY, N.P.; VAVILOV, V.S.; VALEYEV, Kh.S.; DROZDOV, N.G.; KORITSKIY, Yu.V.; PRIVEZENTSEV, V.A.; RENNE, V.T.; TAREYEV, B.M.; YAMANOV, S.A.

B.M. Vul; on his 60th birthday and 35th anniversary of his scientific work. Elektrichestvo no.8:95 Ag '63. (MIRA 16:10)

BOGORODITSKIY, N.P.; FRIDBERG, I.D.

Electroconductivity of solid dielectrics. Fiz. tver. tela 6 no.3:680-683 Mr '64. (MIRA 17:4)

1. Leningradskiy elektrotekhnicheskiy institut imeni Ul'yanova (Lenina).

ACCESSION NR: AP4019824

S/0181/64/006/003/0680/0683

AUTHORS: Bogoroditskiy, N. P.; Fridberg, I. D.

TITLE: The electrical conductivity of solid dielectrics

SOURCE: Fizika tverdogo tela, v. 6, no. 3, 1964, 680-683

TOPIC TAGS: electric conductivity, dielectric, current carrier, solid state, crystal lattice

ABSTRACT: This is a survey of existing theories on the subject. The authors consider a classification of conductivity: first, conductivity not associated with formation of donor or acceptor centers in the lattice, embracing three classical types -- pure electron, cation-cation, and cation-anion; and, secondly, conductivity associated with the formation of donor or acceptor centers in the lattice, also embracing three types -- cation-electron, anion-electron, and cation-anion-electron. Each type is analyzed briefly. The authors note that one type is commonly superimposed on another, but that one is generally dominant, depending on the temperature. They conclude that a consideration of the facts -- the materials and environmental state -- permit the determination of the mechanism of conductivity in any specific instance.

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ACCESSION NR: AP4019824

ASSOCIATION: Leningradskiy elektrotekhnicheskiy institut im. V. I. Ul'yanova (Lenina) (Leningrad Electrical Engineering Institute)

SUBMITTED: 06Jul63 DATE ACQ: 31Mar64 ENCL: 00

SUB CODE: EM, SS NO REF SOV: 007 OTHER: 001

Card 2/2

ACCESSION NR: AP4043345 S/0181/64/006/008/2301/2306

AUTHORS: Bogoroditskiy, N. P.; Tairova, D. A.; Sorokin, V. S.

TITLE: Role of free carriers in the formation of the electret state in polycrystalline dielectrics

SOURCE: Fizika tverdogo tela, v. 6, no. 8, 1964, 2301-2306

TOPIC TAGS: barium titanate, polycrystal, electret, dielectric material, ceramic dielectric, polarization, energy level

ABSTRACT: To explain the formation of the electret state in non-polar materials, an investigation was made of several phenomena occurring in ceramic materials polarized in a field of high intensity and at high temperature. The materials investigated were T-1700 (the fundamental crystalline phase of $BaTiO_3$), Sm-1 ($BaTiO_3$), T-150 ($CaTiO_3$), T-80 (TiO_2), and T-900 ($SrTiO_3$), all with different elec-

ACCESSION NR: AP4043345

tric properties. The materials were in the form of discs 33 mm in diameter and 3 mm thick; the electric field intensity, the maximum temperature, and the time of exposure to the field were variable. The magnitude and sign of the surface charge were measured by the electrostatic induction method. The role of the free carriers in the formation of a stable homogeneous charge of ceramic electrets was investigated. The dependence of the coloring of the samples on the magnitude of the polarizing field, maximum temperature, and polarization time was studied, with particular attention to the double coloring of some of the materials (T-1700 and SM-1), which is found to be due to the injection of electrons and holes from the electrodes into the dielectric with subsequent localization on Schottky defects. A new model of the electret state in nonpolar dielectrics is formulated. According to this model, the homogeneous charge is produced and exists independently of the presence of polar groups in the dielectrics, which depends on the technological polarization factors and on the surface properties such as concentration

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ACCESSION NR: AP4043345

and depth of local levels. This homogeneous charge forms a residual field having the same direction as the external polarizing field. The field of the homogeneous charges tends to maintain the polarization effects produced by all other polarization mechanisms. Orig. art. has: 1 figure and 2 tables.

ASSOCIATION: Leningradskiy elektrotekhnicheskiy institut im. V. I. Ul'yanova-Lenina (Leningrad Electrotechnical Institute)

SUBMITTED: 11Feb64 ENCL: 00

SUB CODE: SS, EM NR REF SOV: 001 OTHER: 001

Card 3/3

BOGORODITSKIY, N.P., doktor tekhn. nauk; FRIDBERG, I.D., kand. tekhn. nauk

Dielectrics and problems of active components in radio electronics. Elektrichestvo no.9:23-30 S '64. (MIRA 17:10)

1. Leningradskiy elektrotekhnicheskiy institut imeni Ul'yanova (Lenina).

BOGORODITSKIY, Nikolay Petrovich; VOLOKOBINSKIY, Yuriy Mikhaylovich; VOROB'YEV, Aleksandr Akimovich; TAREYEV, Boris Mikhaylovich; RENNE, V.T., retsenzent; VODOP'YANOV, K.K., retsenzent; KAZARNOVSKIY, D.M., nauchn. red.; PAVLOVA, L.S., red.

[Theory of dielectrics] Teoriia dielektrikov. Moskva, Energiia, 1965. 344 p. (MIRA 18:12)

BOGORODITSKIY, N.P., doktor tekhn. nauk, prof.; FRIDBERG, I.D., kand. tekhn. nauk

Progress in the field of electronics and dielectric ceramics. Elektrichestvo no.8:1-7 Ag '65. (MIRA 18:9)

1. Leningradskiy elektrotekhnicheskiy institut imeni V.I. Ul'yanova (Lenina).

L 38603-65 EWT(1)/EPA(s)-2/EWT(m)/EWP(e)/EPF(n)-2/EPA(w)-2/EEC(t)/EWP(b) Pab-10/
Pt-10/Pu-4/Pl-4 IJP(c) CG/WH
ACCESSION NR: AP5005325 S/0181/65/007/002/0659/0661

AUTHOR: Bogoroditskiy, N. P.; Rudakov, V. N.; Tairova, D. A.

TITLE: Electric anisotropy in polarized ceramic materials (electrets)

SOURCE: Fizika tverdogo tela, v. 7, no. 2, 1965, 659-661

TOPIC TAGS: polarization, ceramic material, electric anisotropy, electret, polarized structure, electric constant

ABSTRACT: To study the anisotropy in ceramic electrets made of T-150 material, the authors used an electromagnetic polaroscope with 8 mm operating wavelength, constructed at the LETI im. V. I. Ul'yanova (Lenina) (V. N. Rudakov, Izv. VUZ, Fizika, v. 2, 7, 1962). The investigated sample was secured in a special frame located between two antennas, one of which radiated and the other received [illegible] electromagnetic waves. When the antenna polarization planes were crossed, the electromagnetic signal could be received only if the invest[illegible] the planar polarization of the electromagnetic waves pass[illegible] occurred when the waves were diffracted by local defects, and also in the presence of anisotropy of the dielectric constant. If the antenna polarization planes were

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L 38603-65
ACCESSION NR: AP5005325

made parallel to each other, the polaroscope operated like electromagnetic defectoscope. This defectoscope was used to investigate first unpolarized samples, and then these samples were placed in a polaroscope. This made it possible to observe the anisotropy of the dielectric constant in the plane of the sample. X-ray investigations have shown that the anisotropy of the polarized materials is not connected with phase transformations, and is due to the appearance of strains and stresses in the polarized medium. In the case of electrets, the stresses may be due to the field of the homo-charges. The lifetime of the home-charges is governed not by Maxwellian relaxation, connected with the conductivity of the dielectric, but by the lifetimes on the local adhesion levels. In the presence of spontaneous polarization, the residual domain orientation is superimposed on the induced polarization. Orig. art. has: 1 figure and 3 formulas.

ASSOCIATION: Leningradskiy elektrotekhnicheskiy institut im. V. I. Ul'yanova (lenina) (Leningrad Electrotechnical Institute)

SUBMITTED: 15Jul64 ENCL: 00 SUB CODE: SS, EM

NR REF SOV: 003 OTHER: 001

Card 2/2

L 29962-65 EWT(m)/EWP(t)/EWP(b) IJP(c) JD/JG

ACCESSION NR: AP5005886 S/0020/65/160/003/0578/0581

AUTHOR: Bogoroditskiy, N.P.; Pasynkov, V.V.; ...

TITLE: Electrical properties of oxides of rare-earth elements

SOURCE: AN SSSR. Doklady, v. 160, no. 3, 1965, ...

TOPIC TAGS: rare earth element, rare earth element oxide, electrical property, electrical resistivity, electrical conductivity, ... dielectric constant, optical dielectric permittivity

ABSTRACT: The electrical properties of oxides of rare-earth elements (r-e) have been investigated at temperatures up to ... The temperature dependence of resistivity (see Fig. 1 of the ...) that Tb_2O_3 and PrO_2 are semiconductors, while other r-e oxides can be classed as dielectrics. All r-e oxides have electron ... less than ... dielectric constant ... frequency ...

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L 29952-65

ACCESSION NR: AP5005886

changes very slightly in the 20—300C range at a frequency [illegible]
20—300C, the temperature coefficient of [illegible] for [illegible]
zero, which makes [illegible] suitable for making [illegible]
[illegible] to be a [illegible]

NO REF SOV: [illegible] OTHER: 001 ATD PRESS: [illegible]

Card 2/3

ACCESSION NR: AP5005386

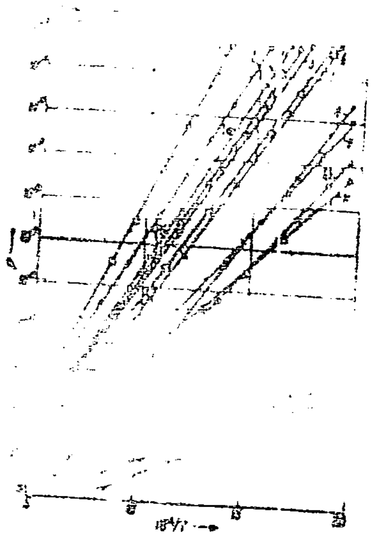

Fig. 1. Tem- [illegible]
resistivity

1 - Lu_2O_3; [illegible]
[illegible]

ACC NR: AP7005354

SOURCE CODE: UR/0181/67/009/001/0253/0256

AUTHOR: Bogoroditskiy, N. P.; Kristya, V.; Panova, Ya. I.

ORG: Leningrad Electrotechnical Institute im. V. I. Ul'yanov (Lenin) (Leningradskiy elektrotekhnicheskiy institut)

TITLE: Electric properties of rutile alloyed with niobium

SOURCE: Fizika tverdogo tela, v. 9, no. 1, 1967, 253-256

TOPIC TAGS: semiconductor, rutile, electric conductivity, TEST, Hall effect, niobium containing alloy, TITANIUM OXIDE

ABSTRACT: Rutile single crystals alloyed with 0.005—1.0% niobium were doubly annealed in air at 800°C for 3 hr and slowly cooled. Specimens cut from the crystals were tested for electric conductivity and Hall effect at 84—500°K. It was found that alloying rutile with 0.005—0.05% niobium sharply increases its conductivity. Further increases in concentration, however, produce saturation. To test the effect of reduction on the properties of alloyed rutile, the specimens were reduced in a vacuum of $4\cdot10^{-3}$ mm Hg at 900°C for 20 min. The conductivity of an unalloyed control specimen increased twelve orders of magnitude, while that of an alloyed specimen increased only 1.2—1.5 times. The change in Hall effect was similar. It was also determined that semiconducting rutile alloyed with niobium is more resistant to

Card 1/2

UDC: none

ATABEKOV, G.I.; BASHARIN, A.V.; BOGORODITSKIY, N.P.; BULGAKOV, K.V.; VASIL'YEV, D.V.; YEGIAZAROV, I.V.; YERMOLIN, N.P.; KOSTENKO, M.P.; MATKHANOV, P.N.; NOVASH, V.I.; NORNEVSKIY, B.I.; RUTSKIY, A.I.; RYZHOV, P.I.; SOLOV'YEV, I.I.; SOLODNIKOV, G.S.; SLEPYAN, Ya.Yu.; SMUROVA, N.V.; TINYAKOV, N.A.; FATEYEV, A.V.; FEDOSEYEV, A.M.; SHABADASH, B.I.; SHCHEDRIN, N.N.

Viktor Ivanovich Ivanov, 1900-1964; obituary. Izv. vys. ucheb. zav.; energ. 8 no.1:122-123 Ja '65.

(MIRA 18:2)

ACC NR: AR6020761 SOURCE CODE: UR/0269/66/000/003/0038/0038

AUTHOR: Bogorods'kyy, O. F.; Turchaninova, E. V.

TITLE: Investigation of the spectral energy distribution at the centers of planetary nebulae

SOURCE: Ref. zh. Astronomiya, Abs. 3.51.328

REF SOURCE: Visnyk Kyyivs'k. un-tu. Ser. astron., no. 6, 1964, 3-8

TOPIC TAGS: spectral energy distribution, nebula

ABSTRACT: Various methods are considered which are used to determine temperatures at the centers of planetary nebulae. Spectral energy distribution at the centers is presented as a sequence of sections of Planck's curves corresponding to various temperatures. The spectral energy distribution is calculated for the center of nebula NGC6572. V. G. [Translation of abstract]

SUB CODE: 03

Card 1/1

UDC: 523.852.22

BOGORODITSKIY, P.V.

Mass development of the polychaete Mercierella enigmatica Fauvel in Krasnovodsk Gulf. Trudy Inst. okean. 70:26-28 '63. (MIRA 17:7)

BOGORODSKIY, A.F.

Principle of equivalence in the general relativity theory. Publ.KAO no.9:3-10 '61. (MIRA 16:7)

(Relativity (Physics))

BOGORODSKIY, A.F.

Relativistic effects in the motion of artificial earth satellites; report No. 2. Publ. KAO no.11:12-16 '62. (MIRA 16:7)

(Artificial satellites—Orbits)

BOGORODSKIY, A.F.

A photometric effect in the general relativity theory. Publ. KAO no.11:17-23 '62. (MIRA 16:7)

(Relativity(Physics))